

CLAIMS

1. A compressor for compressing a gas, the compressor comprising:
  - a housing defining an inlet and an outlet;
  - an impeller wheel including a plurality of vanes rotatably mounted within the housing;
  - the housing having an inner wall defining a surface located in close proximity to radially outer edges of impeller vanes which sweep across said surface as the impeller wheel rotates about its axis;
  - wherein the inlet comprises:
    - an outer tubular wall extending away from the impeller wheel in an upstream direction and forming a gas intake portion of the inlet;
    - an inner tubular wall extending away from the impeller wheel in an upstream direction within the outer tubular wall and defining an inducer portion of the inlet;
    - an annular gas flow passage defined between the inner and outer tubular walls;
    - at least one downstream aperture communicating between a downstream portion of the annular flow passage and said surface of the housing swept by the impeller vanes;
    - at least one upstream aperture communicating between an upstream portion of the annular flow passage and the inducer or intake portions of the inlet; and
    - a plurality of inlet guide vanes mounted within the inducer portion of the inlet downstream of said at least one upstream aperture to induce pre-swirl in gas flowing through the inducer portion of the inlet.
2. A compressor according to claim 1, wherein the annular flow passage is open at its upstream end so that said at least one upstream aperture is an annular opening defined at the upstream end of the inner tubular wall.
3. A compressor according to claim 1, wherein the inlet guide vanes are supported by the inner tubular wall.

4. A compressor according to claim 3, wherein the inlet guide vanes are each supported between the inner tubular wall and a central nose portion lying along the axis of the compressor.
5. A compressor according to claim 1, wherein the guide vanes are adjustable to selectively vary the degree of pre-swirl induced in the gas flowing through the inducer.
6. A compressor according to claim 5, wherein each inlet guide vane is pivotable about a radial axis to vary the angle of the vane relative to a plane parallel to the axis of the compressor to vary the degree of pre-swirl.
7. A compressor according to claim 6, wherein each vane is mounted on a respective radial stem which extends through the inner tubular wall, and an actuator is provided for rotating each vane stem to thereby pivot the respective vane.
8. A compressor according to claim 7, wherein said actuator comprises an annular member disposed around the inner tubular wall and connected to each of the inlet guide vane stems via a respective connecting arm, whereby rotational movement of the annular member about the inner tubular wall is transmitted to each inlet guide vane stem to simultaneously adjust the angle of each guide vane.
9. A compressor according to claim 1, wherein said annular gas flow passage has a length L1 measured along its axis between its upstream and downstream ends, the inner tubular wall extending upstream of said at least one downstream aperture by a length L2 measured along its axis, and wherein  $L1/D > 0.65$  and/or  $L2/D > 0.6$ , where D is a diameter of the inner tubular wall.

10. A compressor according to claim 9, wherein the lengths L1 and L2 are either entirely straight or at least in part curved.

11. A compressor according to claim 1, wherein the inner tubular wall and the annular passage are co-axial having an axis which is a continuation of the impeller wheel axis.

12. A compressor according to claim 1, wherein the inner tubular wall screws into an annular socket defined by said outer tubular wall.

13. A compressor according to claim 1, wherein the outer tubular wall is secured by bolts or the like to an exducer portion to the compressor housing.

14. A turbocharger comprising a compressor said compressor comprising:  
a housing defining an inlet and an outlet;  
an impeller wheel including a plurality of vanes rotatably mounted within the housing;

the housing having an inner wall defining a surface located in close proximity to radially outer edges of impeller vanes which sweep across said surface as the impeller wheel rotates about its axis;

wherein the inlet comprises:

an outer tubular wall extending away from the impeller wheel in an upstream direction and forming a gas intake portion of the inlet;

an inner tubular wall extending away from the impeller wheel in an upstream direction within the outer tubular wall and defining an inducer portion of the inlet;

an annular gas flow passage defined between the inner and outer tubular walls;

at least one downstream aperture communicating between a downstream portion of the annular flow passage and said surface of the housing swept by the impeller vanes;

at least one upstream aperture communicating between an upstream portion of the annular flow passage and the inducer or intake portions of the inlet; and

a plurality of inlet guide vanes mounted within the inducer portion of the inlet downstream of said at least one upstream aperture to induce pre-swirl in gas flowing through the inducer portion of the inlet..